Of these cases five of pharyngotomy and two of pharyngolaryngectomy have remained well for more than eight years. That is, out of fifty-five operations nineteen were successful, or 29 per cent. Against this must be taken into account that some cases have to be rejected as inoperable and that some of the operations are of a mutilating character; but, again, the operation has succeeded in some cases after the failure of radiation.

On the other hand, at any rate until recent years, the results obtained by treatment with *x* rays or radium in this class of lower pharyngeal or extrinsic laryngeal tumour were almost negligible and the condition of many patients was aggravated. It is in this class of case, in which the operations are particularly difficult and require ceaseless care and patience in the subsequent management, that an alternative treatment by *x* rays or radium would be welcome if a reasonable percentage of successful results can be obtained.

In the group of intrinsic cancers of the larynx, including tumours of the vocal cords—a few being on the ventricular bands or having origin in the ventricle, and some being of subglottic origin—the operative treatment is either by laryngo-fissure (with which partial laryngectomy may be included) or by total laryngectomy. The position and extent of the growth here again determine whether simple removal of a vocal cord on one side is done, or whether the front of the larynx or the whole larynx has to be removed.

Gluck and Soerensen record, for intrinsic cancer, 141 cases of laryngo-fissure with nine deaths from the operation and ten recurrences, 122 patients remaining well for at least three years. They also record 501 cases of total laryngectomy for intrinsic cancer. This number includes a series of 100 with two deaths, and in the last 181 cases there were twelve deaths from the operation. During the last ten years there were 30 per cent. of lasting good results.

The following are particulars of operations on my own cases of intrinsic cancer.

TABLE II

	No.	Died	Recurrence or Untraced	Remain Well
Laryngo-fissure or partial laryngectomy:				
Private patients	16	1	1	14
Hospital „	7	1	2	4
Total	23	2	3	18
Total laryngectomy:				
Private patients	42	2	9	31
Hospital „	33	12	7	14
Total	75	14	16	45

Of these cases nine of laryngo-fissure and eighteen of laryngectomy have remained well for more than eight years, including three for more than fifteen years.

In this group, out of ninety-eight operations seventy-three were successful—that is, 74 per cent. Here, again, some of the operations are of a mutilating character, but in early cases where only a vocal cord is removed the voice is often normal and much better than after treatment by radium. This group also includes patients in whom the cartilages had been attacked by growth or in whom perichondritis had supervened, rendering them unsuitable for treatment by radiation.

It is in this group that irradiation has had most success, and therefore that line of treatment is the most attractive, but it has to be shown that it can produce a large percentage of good results. I suggest that if radiation be employed it should be in the form of the radium beam, and that needles should no longer be used.

The figures for the operations have been given separately for the private and hospital patients because, although the numbers of each are approximately equal, the results in private practice are very much superior owing to the better condition, both general and dental, of the patients, the segregation of the patients in private rooms, the avoidance of changes in nursing staff, and the constant personal supervision of the surgeon.

In introducing this discussion I wish to avoid undue emphasis upon any particular method of treatment. This is particularly dangerous in discussing malignant disease, because in practice individual cases have to be considered, and, whatever the treatment, the prognosis of any one case is always doubtful, however favourable it may appear on the one hand or unfavourable, short of being quite hopeless, on the other. There is therefore, when failure ensues, often a feeling of regret that different treatment was not instituted, especially when irradiation fails to cure an operable case. Operation, too, might have failed, and I am concerned only to bring forward some points in the hope that the ensuing discussion may help to clarify the position.

I have to thank Mr. Arthur Pereira, registrar at St. George's Hospital, for his help in following up the fate of the patients and in preparing the statistical tables.

THE DIAGNOSIS OF UNDESCENDED TESTICLE

BY

DENIS BROWNE, F.R.C.S.

Surgeon to the Hospital for Sick Children, Great Ormond Street, London

There are few conditions upon which more contradictory diagnosis and advice can be obtained from the medical profession than those which fall into the vague and elastic category of "undescended testicle." I know a parent who was told that her son's testicles:

(*a*) Needed immediate operation if he were not to be practically a eunuch. (A surgeon of great experience.)

(*b*) Should be left for five years to see what happened. (Another reputable surgeon.)

(*c*) Should be treated by hormone injections. (A physician.)

(*d*) Should on no account be operated upon, as the operation invariably failed. (The family general practitioner.)

(*e*) Were normal. (Myself.)

(*f*) Were held up owing to a displaced vertebra. (An osteopath.)

It is hardly necessary to say that the last diagnosis and the treatment that followed are now held responsible for the present obviously satisfactory condition of affairs. Admittedly this is an extreme case, but others like it are only too common.

When I first began to see numbers of these cases I was continually in doubt as to what advice to give, but latterly they appear to me to belong to certain well-defined groups. It may be of interest to put forward my present classification: I am far from thinking it a final one, but it is certainly much better than anything I had to start with. One of my difficulties was that the testicle in almost all its varied positions is extremely mobile, so

that it can only be properly charted as somewhere on a range of movement between two points. I have tried describing the variations by the names of these points, but the result was so clumsy that I have been forced to coin names for them.

Misconceptions

Most of the confusion is due to three widely held misconceptions upon elementary points.

1. *The Failure to Recognize the Normal Variations in Positions of the Developing Testis.*—I believe that any position in childhood from which the testicle will in-

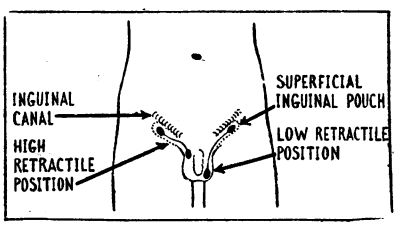

FIG. 1.—This is the diagram which I use for recording the positions of testicles. It shows by conventionalized signs the inguinal canal and the superficial inguinal pouch. The position of the testis is charted by a black oval at each end of its range of movement, connected by a fine line.

variably reach the scrotum should be classed as normal. The custom at present is to describe as undescended any testis that is not in the position which would be normal for an adult.

2. *The Idea that a Testicle which can be Felt in the Deep Tissues in the Region of the Inguinal Canal is Actually in that Canal.*—In the young child the testis frequently disappears upwards out of the scrotum. It is almost universally assumed that it goes into the inguinal canal. It does not. It runs into a space between the fascia of Scarpa and the external oblique muscle which is filled with the loosest of areolar tissue, and bounded whence it slips easily into the track. If this disproof is thought too geometrical, it is possible to try the direct experiment of endeavouring to thrust the testicle up into the intact canal during, for instance, a hernia operation. Eccles (1903), again, speaks of trying to push down a testicle that is in the inguinal canal by manipulations from outside.

If it seems impossible that such a misunderstanding should exist so long I can only point to the way in which surgeons have contentedly operated for generations upon a demonstrably very inaccurate classical account of the anatomy of the whole region involved (Browne, 1933).

A testis that is in the inguinal canal cannot be felt through the skin. It is a soft, elongated, wormlike object; sunk in the soft floor of the canal, shielded from touch by the tense tendon of the external oblique. In consequence I find it difficult to take very seriously those long lists of cases in which testicles, described as being before treatment in the inguinal canal, have descended into the scrotum as a result of pregnyl injections.

3. *The Classing of the Commonest Variety of Ectopic Testis as Undescended.*—This is that variety of ectopia well recognized by certain workers as the superficial inguinal. Barrington-Ward (1937) describes it clearly, and draws the important distinction between the results of operation upon these cases and upon true undescended testes. Unfortunately this distinction is by no means universal; in almost every series of illustrations of the operation for undescended testes this is the position which is shown as the original one, the gland standing out under the skin above the pubis in a characteristic way. I do not think that a testis large enough to be seen clearly through the skin is even permanently arrested in the true line of descent.

Variations in the Position of the Testicle

I believe it should be possible to classify the immense number of positions which the testicle may occupy in such

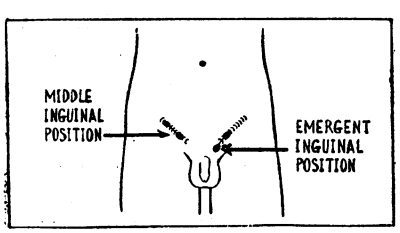

FIG. 2.

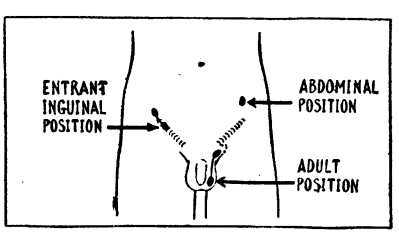

FIG. 3.

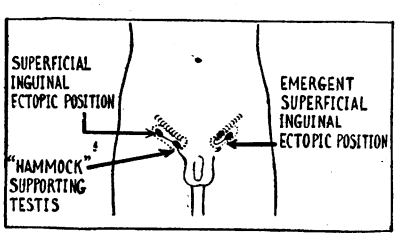

FIG. 4.

quite definitely by the adherence of its anterior and posterior walls. It is about the same size and shape as the scrotal bag in which the testis should normally lie, and runs parallel to the inguinal canal, just to its outer side. I suggest as a name for it the "superficial inguinal pouch." It is just possible that this curious recess is the remains of a mechanism of rest and protection for the testis; something analogous to the seasonal withdrawal inside the abdomen seen in certain animals. This explanation would give a reason for that very peculiar structure, the fascia of Scarpa.

It is curious how little this range of movement of the testis is recognized. Thus, McAdam Eccles (1920) and Hamilton Bailey (1936), both acknowledged authorities on the subject, speak of the testis being withdrawn by the cremaster from the scrotum into the inguinal canal. A consideration of the maximum amount of shortening of muscle fibres will show that this is impossible: all the cremaster can do is pull up the testis over the pubis, a way as to give a valuable guide to prognosis and treatment. I am very conscious that the attempt which follows is open to criticisms, and I should welcome any that may be made. It follows the obvious lines of dividing the variations into three classes. First, the normal, in which, as I have said, I include those positions from which a testicle will invariably spontaneously descend to the bottom of the scrotum by the time that growth is complete. Secondly, the undescended positions, in which the testis has been arrested in its line of travel from kidney to scrotum at some point from which there will not be spontaneous descent. Thirdly, the ectopic, in which there is a turning aside from the direct line of descent.

1. NORMAL VARIATIONS

(A) *Adult.*—In this the testes range from the bottom to the neck of the scrotum according to the contraction of dartos and cremaster. Most testes are like this at

birth, and there is never any question of the correctness of their position.

(B) *Low Retractile.*—In this common variety the lower limit of the range of movement is the same as in the adult—the bottom of the scrotum. But the testis is so light and small, and the cremaster so active, that it is often pulled up over the bar of the pubic bone. Once over this it runs freely into the superficial inguinal pouch, and may stay there for days, though it can always be forced down with the fingers.

Diagnosis.—It is often diagnosed as "undescended testicle."

Treatment.—I have known these patients given injections of pregnyl with excellent results. I hope they are never operated upon. Needless to say they only need leaving alone.

(C) *High Retractile.*—In these the testis remains habitually running freely in the superficial inguinal pouch, and does not spontaneously descend thence during childhood. It can, however, be pushed down well below the external ring, over the pubic bone, and into the neck of the scrotum. This lower range of movement is the very important distinction between it and the superficial inguinal ectopic position.

Diagnosis.—It is almost invariably diagnosed as an "undescended testicle."

Treatment.—I believe that this class supplies the greater number of the successes of pregnyl treatment, which undoubtedly in many cases does enlarge the size of the gland and hurry its descent. A considerable number are operated upon, usually with good results.

In my experience in these cases descent invariably occurs spontaneously when the testicle begins to enlarge to the adult size and weight: I have never seen or heard of an adult testicle with this range of movement. Certain cases for which I advised operation, and which to my confusion developed normally without it, undoubtedly belonged to this category. They are also the justification of the policy of waiting to see what happens, and account for "undescended testis" being about three times as common in children as it is in adults.

2. UNDESCENDED POSITIONS

(A) *Emergent Inguinal.*—In this position the testicle can be felt popping in and out of the external ring, moving freely in the hernial sac that invariably exists, much as an ovary often behaves in an infant of the opposite sex. It should be noted that the testis only emerges or withdraws according to the mechanical forces acting upon it, such as increased abdominal pressure in one direction or the surgeon's finger in the other. It is never pulled in by a contraction of the cremaster, which is always very poorly developed in these cases.

Diagnosis.—This may be as difficult as that of a small inguinal hernia: the testis may be easy to feel one day and impossible the next. This is fortunately of no great importance, as the treatment is the same as that of the conditions with which this variety may be confused.

Prognosis.—I am not sure what would be the fate of a testis of this sort if left untouched till adult life, as I have never felt it justifiable to do so. If bowel descends into the hernial sac it would probably drag the testis down into the scrotum with it. Apart from this, as the enlargement of puberty caused the testis to become a tighter and tighter fit in the external ring, it would finally be shut out permanently, as the forces which drive it out are so much stronger than those which draw it in. Probably it would end up in the superficial inguinal pouch rather than make its way into the atrophic scrotum which is usually present in these cases. It is impossible to say that these testes never descend either spontaneously or after the administration of pregnyl, but I have never seen one do so.

Treatment.—In every case operation, at which the coexisting hernial sac is removed.

(B) *Middle Inguinal.*—These testicles run in a hernial sac from one end of the inguinal canal to the other. They are invariably badly developed, soft, and elongated to fit the space in which they lie. It is curious to see how they change into the normal compact rounded shape if they are successfully shifted into the scrotum.

Diagnosis.—The main point is that it is impossible to diagnose this position without operation, since, as has been said, it is impossible to feel a testis in the inguinal canal. Consequently till the canal is opened one cannot say whether the testis is in it, in the abdominal cavity, or is absent altogether.

Prognosis.—I believe that these testes never descend spontaneously or as a result of hormone treatment. Descent of bowel into the hernial sac would probably bring one down.

Treatment.—Operation in every case.

(C) *Entrant Inguinal.*—The testis varies in position between the upper end of the inguinal canal and the abdominal cavity. Its only important point of distinction from the preceding class is the greater difficulty of bringing it down at operation.

(D) *Abdominal.*—Here the main point of interest is whether, if one does not find a testicle in the inguinal canal, one is justified in opening the abdomen to search for it.

3. ECTOPIC POSITIONS

(A) *Superficial Inguinal.*—In this position the testis lies in the lower part of the superficial inguinal pouch, free to move up in it to an extent determined by the length of its cord. To arrive there it has turned sharply upwards and outwards on leaving the external ring, apparently because of an abnormal attachment of the fascia of Scarpa to the pubic bone. This means that instead of the inguinal pouch having an open lower end, the way from it into the scrotum is blocked by a strong fibrous hammock, in which the testis lies supported. As I have said, some surgeons recognize this common position as an ectopia, but many do not. Ombrédanne (1932) does not figure it in his diagram of the directions in which ectopia may occur, and McAdam Eccles shows several examples of it in his classic work as inguinal retention and not as ectopia. A point of interest is that if a large hernia develops in this position it will descend into the inguino-crural fold, not into the scrotum.

Diagnosis.—The most important single point in the diagnosis of testicular position is the distinction between this displacement and the high retractile testis. One needs operation and one does not. One responds to pregnyl and one does not. One develops normally if left alone and one does not.

Prognosis.—There is no possibility of spontaneous descent.

Treatment.—I have known vast amounts of pregnyl employed in attacks upon this variety, with no result whatever on the position. It is the one which accounts for the fact, still being confirmed, that cases of unilateral undescended testis average much poorer results with hormone treatment than bilateral ones. Incidentally I would have thought that if one testis had descended normally it might be assumed that, whatever was keeping up the other, it could not be lack of hormones. However, I have never had this objection taken seriously as a reason against giving a course. The only treatment is operation. It is easier than in a true undescended testicle, owing to the extra length of cord.

(B) *Emergent Superficial Inguinal Ectopic.*—The distinction between this and the emergent inguinal position is merely a fine shade of diagnosis. In everything else they are alike.

(C) *Other Ectopic Positions.*—The penile, femoral, perineal, and other well-recognized positions present no diffi-

culties in diagnosis. As a curiosity I may mention being called to operate upon what was diagnosed as an acute appendix. Actually it was a torsion of a testicle between the two oblique muscles over McBurney's point.

Summary

To recapitulate some of the points which have been put forward:

1. A testicle that is in the inguinal canal cannot be felt through the skin. Conversely, a testicle that can be felt is not in the inguinal canal.

2. The testis is never withdrawn into the inguinal canal by the cremaster.

3. When the testis ascends from the scrotum it runs into a somewhat similar pouch above, external to the abdominal muscles.

4. A testis that can be easily seen through the skin anywhere except in the scrotum is ectopic.

5. A testis that can be pushed down over the pubic bone will invariably descend spontaneously by the time full growth is reached.

6. Pregnyl treatment will not bring down any testis that would not have descended without it, though it will hurry the descent. Whether this acceleration is worth the risk of certain disquieting possibilities is a matter of opinion.

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MEASLES

THE CONDUCT OF A SCHOOL EPIDEMIC

BY

F. G. HOBSON, D.S.O., D.M., F.R.C.P.

Honorary Physician to the Radcliffe Infirmary and County Hospital, Oxford

What should be the course and outcome of an epidemic of measles in a school community? The answer to such a question must depend upon a number of considerations—clinical, seasonal, domestic, and economic—and yet each medical officer of a school community must have before him an ideal that it will be his endeavour to realize when faced with the inevitable and recurrent onslaught of measles in the community for which he is responsible.

Agreement is still incomplete upon the elementary data (Hobson, 1934), which may conveniently be stated as under:

1. Measles is due to a virus—as yet unidentified—and a *natural* attack of the disease is generally regarded as conferring a permanent immunity. Second and third attacks of the disease are well known to occur, but are so rare that they can safely be ignored within the age limits of school life. It is frequently stated and generally assumed that an attack of measles, *attenuated* by the administration of immune serum, confers an immunity as permanent as that which results from a natural attack. This reasonable assumption may prove to be well founded, but as yet it rests upon no solid body of clinical evidence.

2. Infection is by droplets from the nasopharyngeal excretions of infected individuals, and a patient may be infectious six days before the appearance of a rash (Hobson, 1934). The catarrhal discharges of the infected may also be the vectors of secondary virulent organisms to other susceptibles.

3. The incubation period is more than ten days, and in serum-treated cases may be twenty-one days. In serum-treated cases there may be no clinical evidence of infection before the explosive appearance of a rash on the twenty-first day (Hobson, 1934).

4. Quarantine should be observed for twenty-one days in all cases.

Measles vies with influenza and whooping-cough as the most infectious disease in a closed or semi-closed community such as a school, and the prospects of limiting the spread of the disease by early diagnosis and segregation of infected individuals are very small indeed. Koplik's spots appear too late and too inconstantly to be of any real value in early diagnosis, and may be recognizable only with the appearance of the rash in serum-treated cases.

The First Principle

If these data be accepted the first principle in conducting a school epidemic will be that the epidemic shall be allowed to take its course and that the susceptibles who succumb shall experience a natural attack of the disease in the maximum *security*, thereby acquiring a permanent immunity. This principle requires amplification:

1. *Susceptibles.*—In each school there will be a small number of "delicate susceptibles" for whom an attack of measles will entail an unusual risk, particularly in the case of those children who are liable to oto-rhinological or pulmonary diseases. For these cases, which should be selected by the school medical officer, serum prophylaxis is clearly indicated. For a few specially delicate susceptibles the dose should be one that will ensure *protection*—such children should then be removed from school to avoid further exposure to infection on a falling tide of passive immunity. For the majority of such "delicate susceptibles" the dose of serum (see later) should be so timed and adjusted as to secure *attenuation* of the attack, and these protected susceptibles should be allowed to continue with normal school routine. The routine use of convalescent serum for all susceptibles is not recommended until the time comes when serum therapy has a scientific posology, and it has been established that the immunity from an *attenuated* attack is as permanent as that which results from a natural attack of the disease. The deliberate postponement of an attack of the disease by *protecting* all susceptibles cannot be considered as wise, although special circumstances may justify such a practice (Hobson, 1934). Such special circumstances must be judged by the medical officer concerned, but a coincident epidemic due to *S. pyogenes* or *H. pertussis* might be mentioned as a circumstance such as would justify an attempt at *mass protection* or *mass attenuation.*

2. *Security.*—The complications of measles present the real danger to health and life, such complications arising from secondary infection by pyogenic cocci, particularly from *S. pyogenes.* Complications may derive from an intrinsic or extrinsic source of infection; they come far more frequently from the latter. *Complications are most usually secondary infectious diseases* arising from cross-infection by neighbours, nurses, or doctors (Okell and Elliott, 1936; Keevil and Camps, 1937). Security from cross-infection can be attained only by strictly observing the established rules of environmental hygiene and nursing, which are familiar to the profession in treating all highly infectious diseases. The measures so indicated can be briefly summarized under the headings of:

Bed Spacing.—A minimum of six feet should be preserved *between the edges of adjacent beds* in well-ventilated sick-rooms or, alternatively, effective barrier nursing. (Where cubicles are available no difficulty arises.)